

RP 402 Fall Protection, Rescue Systems, Climb Assist, and Harness

The following recommended practice (RP) is subject to the disclaimer at the front of this manual. It is important that users read the disclaimer before considering adoption of any portion of this recommended practice.

This recommended practice was prepared by a committee of the AWEA Operations and Maintenance (O&M) Committee.

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Purpose and Scope

The scope of “Fall Protection, Rescue Systems, Climb Assist, and Harness” addresses the common maintenance issues related to the grounding systems for generator and drive train shafts in various wind turbine designs. It is not machine specific and some adaptation may be required based on specific designs.

Fall Protection, Rescue Systems, Climb Assist, and Harness

1. Flexible Cable Ladder Safety System

1.1. Flexible cable ladder systems are designed to provide protection against falling for persons climbing vertical surfaces. These systems include installations on fixed ladders within the tower. The following inspection criteria is for user inspection and information purposes only. Formal inspections of ladder climbing systems must be conducted by personnel certified in their installation and inspection as required by the manufacturer.

2. Cable System Inspection

2.1. Inspect the top and bottom anchorage brackets for damage, corrosion, or rust. Look for cracks, bends, or wear that could affect the strength and operation of the system. Inspect for loose or missing fasteners; re-tighten or replace them if necessary.

2.2. Inspect the cable guides. Ensure the cable guide is not worn or bent, and still locks on the cable. Inspect for loose or missing fasteners; re-tighten or replace them if necessary.

2.3. Inspect the carrier cable for damage. Look for worn or broken cable strands. Inspect for signs of abrasion against the ladder or structure. The cable must not contact the ladder or structure. Replace damaged cable if necessary. Check the carrier cable tension, ensuring there is no slack, and re-tension the carrier cable if necessary.

2.4. Inspect the ladder structure for damage, rust, or deterioration that could affect the strength of the ladder.

2.5. Inspect the installation and service label. The label should be securely held in place and fully legible. Record inspection dates on the system label.

3. Ladder Safety Sleeve Inspection

3.1. Inspect the handle and cable shoe for bends, cracks, and deformation. All fasteners must be securely attached. Operation of the handle and cable shoe must be free and smooth. Spring must be secure and of sufficient strength to pull the handle.

3.2. Inspect the locking lever for smooth operation, ensuring it springs back into its locked position when released.

3.3. Inspect the sleeve body for wear on the inside where the cable passes through.

3.4. Inspect the rollers and the upper roller extension. Ensure the rollers spin freely and the spring rotates the upper roller extension to the climbing position.

3.5. Inspect the gravity stop. Hold the sleeve upside down and ensure the gravity stop rotates into the locking position. It should not be possible to open the sleeve far enough to insert the cable.

3.6. Inspect all labels and markings. Check that labels and markings are fully legible.

4. Rescue Device

4.1. Inspect for loose screws and bent or damaged parts.

4.2. Inspect the side plates for distortion, cracks, or other damage.

- 4.3.** Inspect the rope for cuts, severe abrasion, or wear. Check for contact with acids or other chemicals.
- 4.4.** Inspect to make sure that the rope lies correctly in the pulley.
- 4.5.** Inspect the contact surface of the drum for any sign of wear or strain. Check for distortion in the top loop.
- 4.6.** Do not disassemble the rescue block. It is not user serviceable.
- 4.7.** With the unit properly mounted from any sturdy structure, test the functional load.
 - 4.7.1.** Make sure that the rope drum locks in the clockwise direction (reverse lock operative).
 - 4.7.2.** Make sure that the rope drum rotates freely in the counter-clockwise direction (reverse lock not operative).
 - 4.7.3.** Make sure the stationary pulleys can be inserted and the locking bolt locked and that the locking pins in the locked state protrude about 5/32".

5. Inspection Steps for Pulleys

- 5.1.** Inspect the pulleys to ensure that they are clean and free from grease.
- 5.2.** Inspect the contact surface of the pulleys for any sign of wear or strain. Check for distortion in connecting loops.
- 5.3.** Inspect side plates for distortion, cracks, or other damage.
- 5.4.** Make sure that the pulley can be rotated freely and without resistance. If inspection or operation reveals a defective condition, remove the rescue unit from service immediately.

6. Inspection Cable Sleeve

6.1. Frequency

6.1.1. Before each use inspect the detachable cable sleeve according to Sections 5.2 and 5.3.

6.1.2. Formal Inspection

A formal inspection of a detachable cable sleeve must be performed at least annually by a competent person other than the user. The frequency of formal inspections should be based on conditions of use or exposure, see Sections 5.2 and 5.3. Record the inspection results in an inspection and maintenance log.

6.1.3. After a Fall

A formal inspection of a detachable cable sleeve must be performed by a competent person other than the user. Record the inspection results in an inspection and maintenance log.

6.2. Inspection Guidelines For Cable Sleeve

For identification of the example components described in the following guidelines, see Figure A.

6.2.1. Inspect the handle (1E) and cable shoe (1H) for bends, cracks, and deformities. All fasteners must be securely attached. Operation of handle and cable shoe must be free and smooth. Springs must be secure and of sufficient strength to pull handle down.

6.2.2. Inspect the locking lever (1J) for smooth operation, ensuring it springs back into its locked position when released.

6.2.3. Inspect the sleeve body (1M) for wear on the inside where the cable passes through.

6.2.4. Inspect the impact indicator pin (1L). If the indicator pin is missing or damaged, the sleeve should not be used until the pin is replaced.

6.3. Inspect the energy absorber (1K) to determine it has not been activated. The energy absorber cover should be secure and free of tears or damage.

| | |
|---|------------------------|
| A | Cable |
| B | Upper Roller |
| C | Upper Roller Extension |
| D | Label |
| E | Handle |
| F | Carabiner |
| G | Lower Roller |
| H | Cable Shoe |
| I | Gravity Stop |
| J | Locking Lever |
| K | Energy Absorber |
| L | Impact Indicator Pin |
| M | Sleeve Body |

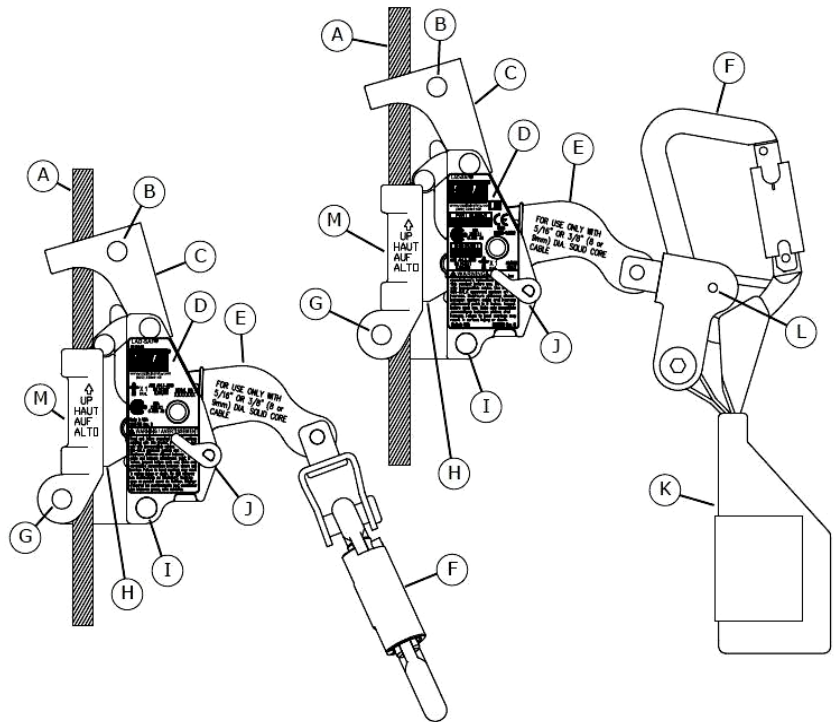


Figure A: Example of Safety Cable Device (Sleeve).

6.4. If inspection reveals an unsafe or defective condition remove the detachable cable Sleeve from service and destroy or contact an authorized service center for repair. Record the results in an inspection and maintenance log.

7. Inspection Climb Assist

7.1. Inspection Frequency

A portable motor control and cable grip must be inspected at the intervals defined by the manufacturer. Examples of inspection procedures are described in the example *Inspection and Maintenance Log* shown in Figure B. Inspect all other components of the Powered Climb Assist System per the frequencies and procedures defined by the manufacturer.

7.2. Defects

If inspection reveals an unsafe or defective condition, replace or repair the affected component(s) prior to further use of a powered climb assist system. Repairs must be performed by an authorized service center.

7.3. Product Life

The functional life of a powered climb assist system is determined by work conditions and maintenance. As long as the product passes inspection criteria, it may remain in service.

7.4. Cleaning

Cable grips may be cleaned using commercial parts cleaning solvents and rinsed with warm, soapy water. Light machine oil may be applied to moving parts if required. Do not use excessive oil or allow oil to contact cable clamping surfaces. Clean attached lanyards with water and mild soap solution. Rinse and thoroughly air dry. Do not force dry with heat.

IMPORTANT: If the cable grip or attached lanyards contact acids or other caustic chemicals, remove from service and wash with water and a mild soap solution. Inspect per Table 2 before returning to service.

| | | | |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|--------------------------|
| Serial Number(s): | | Date Purchased: | |
| Model Number: | | Date of First Use: | |
| Inspection Date: | | Inspected By: | |
| Component: | Inspection: (See Section 1 for <i>Inspection Frequency</i>) | User | Competent Person |
| Cable Grip (Diagram 1) | Inspect the Cable Grip for cracks, bends, or other deformities that might affect performance. The Handle (A) should be securely attached to the Sleeve (B) but should pivot freely around the Rivet (C). Teeth (D) should be present on the end of the handle that contacts the Wire Rope Cable. | <input type="checkbox"/> | <input type="checkbox"/> |
| | Marking on the Cable Grip must be legible. See the back pages of this manual for required markings and their locations. | <input type="checkbox"/> | <input type="checkbox"/> |
| Cable Grip Lanyards (Diagram 2) | If so equipped, inspect attached web lanyards for concentrated wear, frayed strands, broken yarn, burns, cuts, and abrasions. The lanyard must be free of knots throughout its length. Inspect for excessive soiling, paint build-up, and rust staining. Inspect for chemical or heat damage indicated by brown, discolored, or brittle areas. Inspect for ultraviolet damage indicated by discoloration and the presence of splinters and slivers on the webbing. | <input type="checkbox"/> | <input type="checkbox"/> |
| Portable Motor Control Unit (Diagram 3) | The Motor Control Unit Enclosure should be clean and free of cracks or other deformities that might impact performance of internal components. | <input type="checkbox"/> | <input type="checkbox"/> |
| | The Motor Control Unit Power Cord should be free of cracks or holes in the outer casing and frayed, broken, or exposed wires. Plug ends should be free of defects and appropriate for the designated power source. | <input type="checkbox"/> | <input type="checkbox"/> |
| | Plug the Power Cord into the Motor Control Unit and appropriate power source. Pull out the Emergency Stop Button. The lights on the control panel will flash momentarily and then the yellow Power Button (Ⓢ) light (A), first red Climb Assist Force light (B), and one of the green Motor Spin Direction lights (C) will stay lit. Verify that the correct Motor Spin light is lit for your Drive Bracket orientation. Press the Power Button (Ⓢ) and the Power Button light will switch from yellow to green. If the control panel lights do not illuminate in the described manner, consult the Troubleshooting Chart in Section 3.4. | <input type="checkbox"/> | <input type="checkbox"/> |
| | All labels should be present on the Motor Control unit and should be fully legible. See the back pages of this manual for required labels and their locations. | <input type="checkbox"/> | <input type="checkbox"/> |
| Other Components | Inspect the PCAS Brackets, Wire Rope Cable Loop, and Wear Pads per instructions in the "Installation and Maintenance Manual" (5903447). Inspect the Full Body Harness per the Manufacturer's instructions. | <input type="checkbox"/> | <input type="checkbox"/> |

Figure B: Example of Inspection and Maintenance Log.

7.5. Authorized Service

Additional maintenance and servicing procedures should be completed by a factory authorized service center. Authorization should be in writing. Do not attempt to disassemble and repair components of a powered climb assist system.

7.5.1. Storage

When not in use with a powered climb assist system, store motor control units and cable grips in a cool, dry, clean environment out of direct sunlight. Avoid areas where chemical vapors may exist. Thoroughly inspect components after extended storage.

8. Inspection of Full Body Harness

8.1. Frequency

Before each use inspect the full body harness according to the manufacturer's guidelines. The harness must be inspected by a competent person other than the user at least annually. A competent person is one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. Record the results of each formal inspection in an inspection and maintenance log.

IMPORTANT: If the full body harness has been subjected to fall arrest or impact forces it must be immediately removed from service and destroyed.

IMPORTANT: Extreme working conditions (harsh environments, prolonged use, etc.) may require increasing the frequency of inspections.

8.2. Inspection

8.2.1. Inspect Harness Hardware (Buckles, D-rings, Pads, Loop Keepers, Vertical Torso Adjusters)

These items must not be damaged, broken, or distorted and must be free of sharp edges, burrs, cracks, worn parts, or corrosion. PVC coated hardware must be free of cuts, rips, tears, holes, etc., in the coating to ensure non-conductivity. Ensure that release tabs on buckles work freely and that a click is heard when the buckle engages. Inspect vertical torso adjusters for proper operation. Ratchet knobs should turn with ease in a clockwise direction and should only turn counter-clockwise when the knob is pulled out.

8.2.2. Inspect Webbing

Material must be free of frayed, cut, or broken fibers. Check for tears, abrasions, mold, burns, or discoloration. Inspect stitching; check for pulled or cut stitches. Broken stitches may be an indication that the harness has been impact loaded and must be removed from service. When performing the annual formal inspection, unsnap and open the back pad to facilitate inspection of the webbing.

8.2.3. Inspect the Labels

All labels should be present and fully legible.

8.2.4. Inspect System Components and Subsystems

Inspect each system component or subsystem according to manufacturer's instructions.

8.2.5. Record Inspection Data

Record the inspection date and results in an inspection and maintenance log.

8.2.6. Inspect the Stitched Impact Indicator

The stitched impact indicator, shown in Figure C, is a section of webbing that is lapped back on itself and secured with a specific stitch pattern holding the lap. The stitch pattern is designed to release when the harness arrests a fall or has been subjected to an equivalent force. If the impact indicator has been activated, the harness must be removed from service and destroyed.

8.2.7. Inspect Suspension Trauma Straps

Check the trauma strap pouches for damage and secure connection to the harness. Unzip the trauma strap pouch on each hip of the harness and inspect suspension trauma straps. Webbing and pouch material must be free of frayed, cut, or broken fibers. Check for tears, abrasions, mold, burns, discoloration, or knots.

IMPORTANT: If inspection reveals a defective condition, remove the unit from service immediately and destroy it.

NOTE: Only manufacturer or parties authorized in writing should make repairs to this equipment.

A. Stitched Impact Indicator

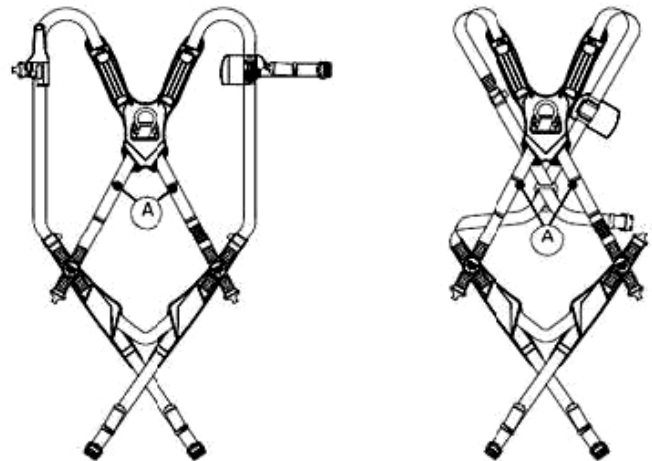


Figure C: Example of Stitched Impact Indicators.

8.3. Washing Instructions

Washing procedures for the full body harness are as follows:

8.3.1. Spot clean the full body harness with water and a mild soap solution.

IMPORTANT: Use a bleach-free detergent when washing the harness and pads. Fabric softener or dryer sheets **SHOULD NOT** be used when laundering and drying the harness and pads.

8.3.2. Water temperature for wash and rinse must not exceed 160°F (70°C).

8.3.3. The harness and pads may be air dried or tumble dried on low heat not exceeding 200°F.

NOTE: More information on cleaning is available from the manufacturer. If you have questions concerning the condition of your harness or have any doubt about putting it into service, contact the manufacturer.

8.4. Additional Maintenance and Servicing

Additional maintenance and servicing procedures should be completed by a factory authorized service center. Do not attempt to disassemble the unit.

8.5. Storage

Store the full body harness in a cool, dry, clean environment out of direct sunlight. Avoid areas where chemical vapors may exist. Thoroughly inspect the full body harness after extended storage.